Saskatchewan Health
Saskatchewan Environment and Resource Management
Saskatchewan Labour

SASKATCHEWAN BIOMEDICAL WASTE MANAGEMENT GUIDELINES

March, 1998

Government of
Saskatchewan

March, 1998

Dear Biomedical Waste Stakeholder:

In 1991, the Saskatchewan Interim Biomedical Waste Management Guidelines were released as a first step in the development of a strategy for dealing with the management of biomedical waste in this province. Since that time, the Saskatchewan Association of Health Organizations (SAHO) has urged the provincial government to have the guidelines modified to reflect what can be reasonably achieved throughout Saskatchewan.

Consequently, a committee comprised of representatives from various government departments, SAHO and others has developed new Saskatchewan Biomedical Waste Management Guidelines. The guidelines, which were circulated for comment to various stakeholders before being finalized, are aimed at protecting our waste handlers, the public and the environment of this province.

We, as deputy ministers responsible for regulations and/or programs relating to the handling and disposal of biomedical waste, support the attached guidelines and encourage you to strive towards the safe management of biomedical wastes.

Sincerely,

Deputy Minister
Saskatchewan Health

Stuart Kramer
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Saskatchewan Labour

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The Saskatchewan Biomedical Waste Management Guidelines were developed under the direction of:

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GLOSSARY OF TERMS

Agent - A pathogen that can cause human or animal disease including bacteria, mycoplasma, fungi, viruses and parasites.

Biomedical Waste - Refer to Section 3.

Compactor - A device employed to reduce the volume of wastes both at the site of generation and during the transportation thereof (e.g., garbage compacting trucks).

Decontamination - A process that removes microorganisms from an object, rendering it safe for handling.

Disinfection - A process that kills most microorganisms but rarely kills all spores. The three levels of disinfection are low, intermediate and high. Disinfectants are substances used to disinfect inanimate objects.

Generator (Consignor) - The facility that produces the waste material and which is registered with the province under the requirements of the Dangerous Goods Transportation Act.

Halogenated - Refers to a type of plastic that contains halogen atoms such as chlorine or fluorine. Combustion of these types of plastic materials results in the generation of acid gases such as hydrogen chloride. Examples of these types of plastic include polyvinyl chloride and fluorocarbon compounds such as Teflon.

Non-halogenated - Refers to a type of plastic which does not contain atoms of halogens such as chlorine or fluorine. Examples of these types of plastic include polyethylene, polycarbonate and polystyrene.

Receiver (Consignee) - The facility that receives waste material and which is registered with Saskatchewan Environment and Resource Management (SERM) under the requirements of the Dangerous Goods Transportation Act.

Sterilization - A process that kills all microorganisms, including bacteria, viruses, spores and fungi.

SECTION 1 - INTRODUCTION

Objective and Rationale

The objective of these guidelines is to provide an approach to the management of human/animal biomedical waste that is safe for the waste handlers, the public and the environment as well as being cost effective and practical.

For decades public health, infection control and occupational health authorities have recognized the need for personnel working in health care facilities to take proper precautions in handling any material that can cause disease or injury. Beyond the occupational risks, public health authorities do not view biomedical waste originating from health care and related facilities as being more hazardous than residential waste. While the real risk is low, it must be recognized that the general public likely perceives biomedical waste as being a serious threat. As a consequence, this set of guidelines has two primary purposes:

1) To reduce the likelihood of workers and the general public contracting a disease or injury from biomedical waste.

2) To educate the public, municipalities and other constituencies about the real and perceived health risk associated with management of biomedical waste.

Further rationale that supports the development of these guidelines includes:

- a means to address problems associated with present practices used by biomedical waste generators;
- a means to reduce air emissions generated by present incineration and other treatment practices as a component of the provincial Clean Air Strategy;
- a means to minimize waste generation as a component of the Saskatchewan Waste Reduction Strategy;
- a means to ease the process of introduction and compliance with amendments to the Transportation of Dangerous Goods Regulations (TDGR); and
- a means for developing a long-term strategy for the management of biomedical waste in Saskatchewan.

The guidelines were developed under the direction of the Saskatchewan Biomedical Waste Management Working Committee (Appendix A). The committee recognized the important contribution made by the previous Biomedical Waste Committee who in 1991 developed the Interim Biomedical Waste Management Guidelines. The new guidelines are largely based on the 1991 edition, but have been modified to reflect what can be reasonably achieved in the field.

Scope

These guidelines are intended to apply to biomedical waste, which with very few exceptions represents only a small percentage of the generator's total waste stream (Section 3). As well, these guidelines relate to the following aspects of biomedical waste management: waste minimization; segregation; collection; containment; in-house movement; storage; transportation; disposal (both on and off-site); and occupational health and safety issues.

While these guidelines are intended to address human/animal biomedical waste, associated with medical interventions, the principles and practices contained in these guidelines can apply to other facilities that generate biomedical waste. These guidelines apply, but are not limited to, the following types of facilities and operations:

- Biomedical Waste: Haulers, Receivers and Treatment Facilities;
- Blood Banks and Blood Collection Centres;
- Clinical Testing or Research Laboratories;
- Community Health Agencies; (e.g., public health offices, nursing clinics, home care);
- Dentists' Offices and Clinics;
- Emergency Measures Departments, Police, Fire, Ambulance;
- Facilities Involved in the Testing or Production of Vaccines;
- Health Care Facilities (e.g., Hospitals, Special Care Homes);
- Home Nursing Services;
- Medical Research and Medical/Health Care Teaching Facilities;
- Mortuaries and Funeral Homes;
- Pharmacies;
- Physicians' Offices and Clinics;
- Pre-hospital Medical Care; and
- Veterinary Facilities.

SECTION 2 - BACKGROUND

Regulatory Framework

The disposal of wastes, which includes biomedical wastes, is primarily subject to provincial control within Canada. As such, a number of statutes have evolved within Saskatchewan, which presently either directly or indirectly govern the treatment and disposal of these wastes in the province. These include: The Environmental Management and Protection Act, The Municipal Refuse Management Regulations, The Water Pollution Control and Waterworks Regulations, The Clean Air Act and Regulations, The Occupational Health and Safety Act and Regulations, The Dangerous Goods Transportation Act and Regulations and potentially municipal bylaws. While no direct reference to disposal of waste is made in *The Public Health Act, 1994*, it does provide power to local authorities (i.e., selected health districts) to abate health hazards, which under certain circumstances could include facility disposal practices. For more information on the legislation and respective agencies refer to Appendix A.

Municipal or other jurisdictional bylaws can also govern some aspects of the disposal of biomedical wastes at solid waste disposal sites or sewer systems. Municipal requirements often vary from one jurisdiction to the next. Generators must establish mutually acceptable arrangements with the respective municipality to ensure that wastes are properly handled and that solid waste disposal site operators are trained and equipped to deal with the wastes that are anticipated.

Enforcement

Non-compliance with these guidelines could result in increased liability for the facility and industry. The power to enforce the requirements of the various statutes lies with the department responsible for their administration. The following is an overview of each agency's statute penalties section.

Saskatchewan Environment and Resource Management (SERM)

- Persons found in contravention of The Environmental Management and Protection Act and regulations made pursuant to that Act may be subject on conviction to a fine of not more than $1,000,000, to imprisonment for not more than 3 years or both. Directors of corporations or organizations are not exempt from penalties under this Act.

- Persons found in contravention of The Clean Air Act may be subject to a control order permanently prohibiting emission of air contaminants or specifying certain conditions. Persons failing to meet the requirements of a permit or failing to comply with a control order may be subject on conviction to a fine of not more than $1,000,000, to imprisonment for not more than 3 years or both.

Saskatchewan Highways and Transportation

- Persons found in contravention of the Dangerous Goods Transportation Act may be subject on conviction to a fine of not more than $50,000 for a first offence and a fine of up to $100,000 for a subsequent offence, to imprisonment for not more than 2 years or both. Provisions exist for penalties associated with certain sections of this Act as well as maximum value for the first offence.

Saskatchewan Labour

- Persons found in contravention of The Occupational Health and Safety Act or Regulations may be subject on conviction to a fine up to $300,000, to imprisonment for not more than 2 years, or both.

Saskatchewan Health - Local Authorities

- Persons found in contravention of The Public Health Act, 1994 may be subject to a fine, in the case of a first offence, of up to $75,000 and to a further fine of up to $100 for each day during which the offence continues and for a second or subsequent offence, a fine of up to $100,000 and a further fine of up to $200 for each day during which the offence continues.

- In the case of a corporation found in contravention of the Act, the corporation may be subject to a fine for a first offence up to $100,000 and to a further fine of up to $1,000 per day during which the offence continues and for a second or subsequent offence, a fine of up to $250,000 and a further fine of up to $5,000 per day during which the offence continues.

SECTION 3 - HEALTH CARE FACILITY WASTE CLASSES

Total Health Care Facility Waste

Refers to all waste, biological or non-biological, which is discarded and not intended for further use.

Industrial Waste

Refers to materials such as chemicals, radio-active substances, batteries, metal, wood, etc.

General Waste

Refers to waste that is neither medical nor industrial waste and includes such things as kitchen, ward, office, and maintenance waste.

Medical Waste

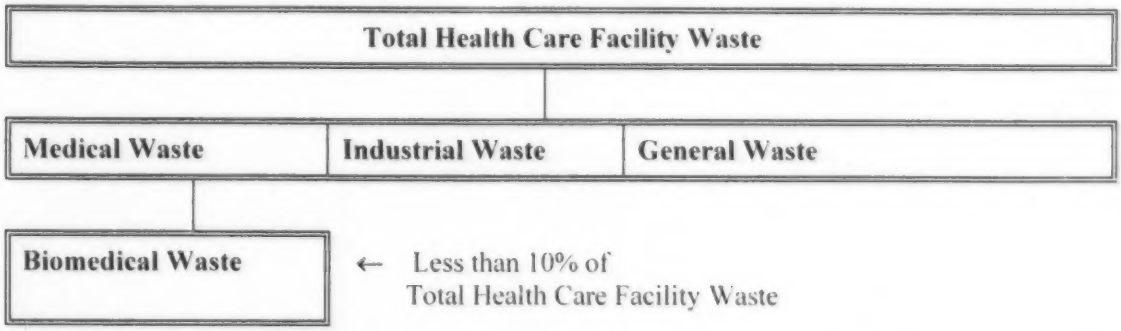
Refers to material generated as a result of the diagnosis or treatment of a patient, such as intravenous tubing or soiled dressings.

Biomedical Waste

Refers to a portion of medical wastes that require special precautions due to the waste being:

a) infectious;
b) sharps;
c) cytotoxic; or
d) especially sensitive due to the nature of the waste (i.e, human body parts).

The waste classes can be illustrated as follows:



SECTION 4 - WASTE MINIMIZATION

Waste minimization is an important first step in managing wastes safely, responsibly and in a cost effective manner. This management step makes use of reducing, reusing and recycling principles. There are many possible routes to minimize the amount of both general waste and biomedical wastes within the health care or related facility. Alternative technologies for biomedical waste minimization (e.g., microwave treatment; hammermill) have been investigated and are not considered to be practical in Saskatchewan at this time. Some of the principles of waste minimization are listed below and will be developed further in the long-term strategy.

Segregation

Hazardous wastes must be segregated from general wastes at the source. This is a regulatory requirement of The Occupational Health and Safety Regulations, 1996.

Segregation minimizes the amount of waste requiring special handling and disposal procedures and reduces the overall costs of disposal. Considerable cost offsets can be achieved if the entire waste stream does not have to be treated as biomedical waste. Only a small proportion of the wastes generated at a health care or similar facility is actually biomedical waste. Further segregation of biomedical waste into the various classes allows for cost effective disposal. These classes include:

- Animal Biomedical Wastes
- Cytotoxic Chemical Wastes
- Human Anatomical Wastes
- Human Blood and Body Fluids Wastes
- Microbiology Laboratory Wastes
- Sharps Wastes
- Special Precaution Wastes

Product Substitution/Process

Product substitution is another means to reduce the amount of wastes generated by a health care or related facility. Some suggestions include:

- Consider and periodically re-evaluate the potential for substitution of single use/disposable medical and surgical supplies with reusable items. Factors such as patient and worker health protection considerations, cost, convenience, labour, available space and worker acceptance should be a part of the evaluation;

- Consider the possibility for product substitution for those with reduced product packaging;

- Consider using suppliers/companies that have a policy of receiving used goods;

- Encourage the use of products that contain recycled materials and initiate recycling of appropriate general wastes wherever possible;

- Employ containers composed of non-halogenated plastics where incineration of the waste is necessary; and

- Encourage suppliers and manufacturers to develop or use products made from non-halogenated plastics or recycled materials.

Conventional Garbage Compactors

Although conventional garbage compactors and compacting vehicles are useful for reducing the volume of wastes they shall not be used for regulated biomedical wastes since the outside container is often destroyed during processing. This applies not only within the health care facility but also during the loading and transportation process. Compactors may still be used for general wastes.

SECTION 5 - BIOMEDICAL WASTE STORAGE

General

The following requirements apply to all biomedical waste classifications. For specific biomedical waste classification storage requirements, refer to Section 6.

Facilities shall determine maximum storage times of refrigerated or frozen biomedical waste based on storage capacity, rate of waste generation, and applicable regulatory requirements.

Contingency plans must be prepared for storing biomedical waste if excess waste is produced, or if either refrigerator, freezer or disposal facilities become inoperative.

Compacting of biomedical waste is prohibited.

Storage Area

After biomedical waste has been collected and moved from its point of generation, it should be held in a storage area that is:

- totally enclosed and separate from supply rooms or food preparation areas;
- lockable and access restricted to authorized personnel only;
- identified as containing biomedical waste with biohazard symbol clearly displayed;
- never used for storage of materials other than waste; **Note:** In cases where the storage area is used for both general and biomedical waste storage, care shall be given to prevent contamination of general waste from biomedical waste.
- permanently marked to prevent recycling as a food storage appliance (as in the case of a domestic-type freezer or cold storage unit);
- kept at a temperature of 4 degrees C or lower for material stored for more than four (4) days; **Note:** For sharps wastes and special precaution wastes storage requirements refer to classifications in Section 6.
- thoroughly cleaned, including floors, walls and ceilings, in accordance with the facility's established procedures as established by Infection Control Committee, Biosafety Officer or other appointed persons.

Animal Biomedical Wastes

Definition

Waste that consists of animal tissues, organs, body parts, carcasses, bedding, fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood and body fluids removed during surgery, treatment, autopsy or for diagnosis that contain or are suspected of containing a serious pathogen. (Agents listed in Appendix C or agents causing the diseases listed in Appendix E).

Strategy

The waste management approach that follows, outlines procedures for disposal of animal biomedical wastes as defined above. **Note:** For proper waste management procedures for animal wastes that are classified as non-biomedical waste see Appendix I.

Animal biomedical wastes should be disposed of by incineration at a facility, approved by SERM, or by means of the services of a SERM approved biomedical waste hauler. Decontaminated liquid wastes that have been disinfected by an appropriate product, can be disposed of by pouring down the sewer, provided the local municipality approves.

In cases where animal wastes are also governed under the Health of Animals Act (Canada), the inspector identified within the Act has the authority to require disposal by means other than those outlined in these guidelines.

Handling, Packaging and Transportation Details

Hazardous wastes shall be segregated at the point of generation from general wastes. Animal biomedical wastes should be segregated from other classes of biomedical wastes.

Where off-site disposal at a SERM approved incinerator is selected, the waste shall be packaged and transported in accordance with the requirements of the TDGR . The liners for containers should not consist of halogenated plastics where disposal is via an incinerator within the province. Containers should be colour coded orange and must be labelled in accordance with Workplace Hazardous Material Information System (WHMIS) and TDGR (Appendix F).

Where disposal at a SERM approved on-site incinerator is to be employed, packaging may include non-halogenated plastic bags alone or in conjunction with a reusable carrying container if necessary and appropriate for the system in use. In these situations the generators must still meet the WHMIS requirements.

Note: Infectious wastes must be handled using infection control procedures outlined in the written plan required by The Occupational Health and Safety Regulations, 1996 (Appendix B).

Storage

Refer to Section 5 for general biomedical waste storage requirements.

Cytotoxic Chemical Wastes

Definition

Waste that consists of drugs that inhibit or prevent the functions of cells and are manufactured, sold or represented for use in treating neoplastic or other conditions.

Strategy

Interim strategies for the management of these wastes include high temperature incineration, chemical degradation or return to supplier.

Note: For the purpose of these guidelines only antineoplastic drugs are included. However, generators of all drugs that are unused, unwanted, unserviceable or expired are encouraged to dispose of the drugs through drug recovery program drop-off sites.*

Handling, Packaging and Transportation Details

Hazardous wastes shall be segregated from general wastes. Cytotoxic chemical wastes should be segregated from other classes of biomedical wastes. The handling, transportation and disposal of these wastes are of concern because of their potential mutagenic, carcinogenic or teratogenic effects.

The primary method for disposal of cytotoxic chemical wastes is by a high temperature incinerator. Presently no such facilities exist within the province, therefore necessitating interim storage and ultimate trans-boundary shipment. These wastes should be stored within sealed rigid containers made of non-halogenated materials. The containers should be colour coded yellow and must bear a cytotoxic symbol (Appendix F) and marked in accordance with WHMIS requirements. A dedicated storage area is required for these wastes. The wastes must ultimately be transported subject to the requirements of the TDGR.

Waste gloves, sharps, masks etc., of this nature are classified as Waste Poisonous Solids, N.O.S.**, P.I.N. 2811, Class 6.1 (9.2), Packing Group I, II, & III.

Chemical degradation is an acceptable option for disposal of small quantities of certain cytotoxic materials or as a recommended protocol for dealing with spills. Where chemical degradation is selected as the disposal pathway, techniques provided by the publication Potentially Carcinogenic Chemicals Information and Disposal Guide (Armour, M.A., et al., 1986) are recommended.

Note: Cytotoxic drugs and associated wastes must be handled and disposed of (on-site disposal) using procedures outlined in the cytotoxic written programs required by The Occupational Health and Safety Regulations, 1996 (Appendix B).

Storage

Refer to Section 5 for general biomedical waste storage requirements.

* Many pharmacies participate in a drug recovery program. Contact the Saskatchewan Pharmaceutical Association for information on participating pharmacies.

** The name of the major poisonous constituent of the waste must follow the N.O.S. (not otherwise specified) notation on the label and the packing group classification will depend on the classification of the most hazardous component.

Human Anatomical Wastes

Definition

Waste that consists of human tissues, organs and body parts, including those parts that have been preserved, but excludes teeth, hair and nails.

Strategy

These wastes require special handling because of aesthetics and sensitivities associated with the waste, not because they necessarily pose any significant risk to human health. Recommended disposal is by incineration at existing crematoria or hospital incinerators approved by SERM (Appendix H). Burial at a cemetery is another alternative for management of these wastes. Treatment of these wastes prior to disposal is not required or recommended. Where the wastes are unrecognizable as human anatomical it may be possible to dispose of the wastes at the local solid waste disposal site. However, prior to doing so, approval will be required from the municipality that operates the disposal site.

Handling, Packaging and Transportation Details

These wastes, primarily for aesthetic reasons, should be segregated at the point of generation from other classes of biomedical and general wastes. In cases where the waste is classified as hazardous by the generator and transported off-site, the waste must be segregated from general waste and packaged in accordance with the requirements of TDGR. Containers should incorporate, where possible, recycled fibre or non-halogenated plastics. Cardboard containers shall not consist of halogenated plastics where disposal is via an incinerator within the province. Containers for human anatomical waste should be colour coded red and must be labelled according to WHMIS requirements since they are not decontaminated prior to disposal (Appendix F). No other types of wastes are to be mixed or included with human anatomical wastes.

Note: Infectious wastes must be handled using infection control procedures outlined in the written plan required by The Occupational Health and Safety Regulations, 1996 (Appendix B).

Storage

Refer to Section 5 for general biomedical waste storage requirements.

Anatomical waste preserved with formalin or equivalent does not require refrigerated storage.

Human Blood and Body Fluids Wastes

Definition

Waste that consists of fluid blood, blood products and body fluids used for diagnosis or removed during surgery, treatment or autopsy.

Strategy

Interim waste management protocols for liquid wastes of this nature includes carefully pouring, following written infection control procedures developed on-site (Appendix B), the wastes down the sanitary sewer while being cautious to prevent the formation of aerosols or spills.

Items saturated or dripping with blood or body fluids that are wet shall be contained in a leak proof container (Appendix F).

Handling, Packaging and Transportation Details

Universal/standard precautions shall apply to the handling of blood and body fluids wastes for all patients/clients/residents. Hazardous wastes shall be segregated at the point of generation from general wastes. Human blood and body fluids wastes should be segregated from other classes of biomedical and general wastes.

Disposal of blood and body fluids wastes can be via the sanitary sewer, provided the local municipality approves.

When autoclaving and disposing of items which are saturated or dripping with blood (e.g., surgical drapes, surgical gowns, sponges, closed drainage tubes and dressings, etc.) is selected, the wastes shall be deposited in a dedicated biomedical waste area within the solid waste disposal site. These items should be packaged within yellow containers or plastic bags, which are sturdy enough to withstand the decontamination and transportation processes (Appendix F). All containers of these waste items must bear a "DECONTAMINATED" label and a generator code. Despite being decontaminated, these wastes require special handling because of aesthetics and sensitivities associated with the waste. Therefore these wastes must be transported apart from general wastes but may be transported along with other classes of biomedical waste.

When autoclaving and disposing at a solid waste disposal site is not available or when more economically feasible, the generator may choose to have a SERM approved carrier dispose of the waste at an approved waste management facility.

While any item that has had contact with blood, exudates or secretions may pose a hazard, it is not generally considered practical or necessary to treat all such waste as biomedical waste. The following items fall into this category (i.e., not considered biomedical waste) if they are dry: soiled dressings; sponges; surgery drapes; lavage tubes; casts; catheters; disposable pads; disposable gloves; specimen containers; lab coats and aprons.

If chemical disinfection is to be employed as part of a spill clean up, a 5,000 ppm solution {1:10 dilution of household bleach (5.25%)} of sodium hypochlorite is recommended for an interval sufficient to destroy the agent of concern. Chemical disinfection is most appropriate for spills of liquids, but it may not sufficiently deal with particulate materials.

Note: Infectious wastes, including items contaminated with dried blood, must be handled using infectious control procedures outlined in the written plan required by Occupational Health and Safety Regulations (Appendix B). Similarly, spills of infectious wastes must be handled using procedures outline in the written plan.

Where disposal of items saturated or dripping with blood by off-site incineration is selected, the waste shall be packaged, labelled and transported in accordance with TDGR. Containers should also be yellow in colour or marked with a yellow 50mm band and be marked in accordance with WHMIS requirements (Appendix F). Where disposal is via an incinerator within the province the containers shall not consist of halogenated plastics.

Storage

Refer to Section 5 for general biomedical waste storage requirements.

Microbiology Laboratory Wastes

Definition

Waste that consists of laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human or animal cell cultures used in research as well as laboratory material that has come into contact with such.

Strategy

Treatment and disposal procedures include autoclaving followed by disposal to sanitary sewer for liquids and disposal at a solid waste disposal site for solids. Transport and incineration of these wastes by means of the services of a biomedical waste transportation and disposal company is acceptable subject to the approval of SERM. In some instances such as liquid spills, chemical decontamination may be acceptable as a treatment protocol.

Handling, Packaging and Transportation Details

Hazardous wastes shall be segregated at the point of generation from general wastes. Microbiology laboratory wastes should be segregated from other classes of biomedical wastes. Evidence proves that once these materials have been properly decontaminated they pose less of a hazard than household refuse. However, careful attention must be paid to the treatment methods to ensure that the wastes are in fact "decontaminated" by the autoclave process (Appendix D). If the waste is autoclaved, the waste can be disposed of with general waste provided it is contained in a package that is labelled as decontaminated.

Wastes classified as microbiology laboratory wastes must not include chemical components which are not otherwise acceptable for the intended waste disposal route, e.g., osmium tetroxide used in sample preparation for electron microscopy.

Where off-site disposal at a SERM approved incinerator is selected, the waste shall be packaged and transported in accordance with the TDGR. Containers should be colour coded yellow and must be labelled in accordance with TDGR and WHMIS requirements (Appendix F).

Note: Infectious wastes must be handled using infection control procedures outlined in the written plan required by The Occupational Health and Safety Regulations, 1996 (Appendix B).

Storage

Refer to Section 5 for general biomedical waste storage requirements.

Microbiology laboratory wastes should be stored in rigid containers with fixed lids of a type to be determined by the health care facility.

Sharps Wastes

Definition

This waste consists of any objects that can penetrate the skin. Sharps wastes includes more than the obvious items used in animal or human patient care: hypodermic needles, re-sheathed needles, syringes (with or without the attached needle which are contaminated by blood and/or body fluids), scalpel blades, lancets, capillary tubes, broken pipettes and medical glassware, broken blood tubes, retorts, and broken culture dishes (regardless of the presence of infectious agents). It also includes other types of broken or unbroken items that have, or are likely to have, come in contact with infectious agents. Examples of these include slides and cover slips, tubing with the needle still attached, and wooden applicator sticks or other objects that can penetrate skin or plastic disposal bags.

Sharps wastes may also be classified as infectious wastes, regulated medical waste, solid waste, or hazardous chemical waste. Regulatory classification depends on how each federal, provincial, or local agency chooses to define the category. However, sharps wastes are universally recognized as requiring stringent regulation for several reasons. These include their association with blood diseases among health care workers, drug abuse, physical injury, and environmental degradation issues that are associated with used sharps.

Strategy

Due to possible risk of infection from blood or body fluids, the handling of sharps wastes requires close adherence to universal/standard precautions, Canadian Council of Ministers of the Environment - Biomedical Waste Guidelines and TDGR requirements for proper classification. While proper classification is important, a more common concern with sharp wastes is that of physical hazards (needle punctures) to those individuals who handle and or dispose of the sharps wastes. All sharps wastes must be handled and contained equally to minimize the risk of infectivity. Thus care and attention must be directed towards the proper handling and packaging of this class of waste.

Handling, Packaging and Transportation Details

Sharps wastes that are intended to be transported shall be marked in accordance with TDGR requirements, if considered to be infectious.

Note: Appendix G outlines more general guidelines for sharps wastes generated by the general public and small institutional type facilities (e.g., personal care homes).

Packaging

All sharps wastes shall be discarded immediately into readily available puncture resistant containers that are marked in accordance with WHMIS (Appendix F). Attention shall be given to ensuring that the container is not over filled. Needles should not be bent, broken, cut, separated from syringes, recapped prior to disposal.

Note: Infectious wastes must be handled using infection control procedures outlined in the written plan required by The Occupational Health and Safety Regulations, 1996 (Appendix B).

Disposal

The final disposal of sharps wastes should be accomplished by one of the following methods:

Cytotoxic or Identified Infectious Sharps Wastes (Risk Groups III and IV):

- At a collection facility (e.g., health facility or a sharps wastes recovery program drop-off site*) then transported (in accordance with TDGR requirements) to a SERM approved hazardous chemical wastes and infectious wastes incinerator.

All Other Sharps Wastes:

- By incineration at a SERM approved incinerator; or
- At a collection facility (e.g., a health facility that accepts sharps wastes from external sources or a sharps wastes recovery program drop-off site*); or
- At a SERM approved solid waste disposal site which has a portion of the site dedicated for the disposal of biomedical waste where **immediate** interment of the sharps wastes shall take place. Care must be taken to ensure that the sharps wastes containers are not subject to direct compacting by heavy equipment; or
- By autoclaving (Appendix D) the sharps wastes in an autoclavable container prior to disposal at a SERM approved solid waste disposal site which has a portion of the site dedicated for the disposal of the biomedical waste. Care must be taken to ensure that the sharps wastes containers are not subject to direct compacting by heavy equipment; or
- By encapsulating (Appendix D) the sharps wastes and disposal at a solid waste disposal site; or
- Where none of the above are available or practical, the generator may arrange with a SERM approved carrier for disposal at a SERM approved waste management facility.

Storage

Refer to Section 5 for general biomedical waste storage requirements.

Refrigeration of sharps wastes is not necessary.

* Contact your local health district for information on participating facilities. Many pharmacies participate in a sharps wastes recovery program. Contact the Saskatchewan Pharmaceutical Association for information on participating pharmacies.

Special Precaution Wastes

Definition

This class of wastes includes body wastes, microbiology laboratory wastes, blood and body fluids, dressings, sharps and virtually all other waste types associated with patients or animals with known or suspected Risk Group 4 agents (Appendix J).

Strategy

Because of their pathogenic nature these wastes are to be treated in accordance with Laboratory Centre for Disease Control, Health and Welfare Canada 1990 Laboratory Biosafety Guidelines at all times.

Handling, Packaging and Transportation Details

These wastes shall be segregated at the point of generation from other classes of biomedical and general wastes. The handling, transport and disposal of special precaution wastes is of concern because the pathogens produce very serious human or animal disease, which is often untreatable and which can be passed by direct, indirect or casual means.

"Although extremely rare and unlikely to appear in Canada, the following procedures must be followed when disposing of wastes contaminated with these agents":

- All liquid wastes, including bed bath wastes, must be treated by dilution with a sodium hypochlorite (5.25%) solution to a 1:5 ratio. Let stand 24 hours and pour into wide mouth polypropylene containers. These should then be autoclaved and carefully poured into the sanitary sewer system; and

- Needles, syringes and solid laboratory wastes shall be placed in puncture resistant containers, double bagged in autoclave bags, autoclaved and then incinerated. Bagged wastes where necessary, shall be placed within outer containers for transport to the approved incinerator.

Where off-site transport for the purposes of incineration is necessary, these wastes shall be packaged and transported in accordance with the TDGR. Because of the potentially serious consequences, special precaution wastes must be transported separately from all other wastes. Containers for these wastes should be colour coded orange and labelled in accordance with TDGR and WHMIS requirements (Appendix F). The liners for the containers shall not consist of halogenated plastics where disposal is via an incinerator within the province.

Note: Infectious wastes must be handled and disposed of (for on-site disposal) using procedures outlined in the written plan required by The Occupational Health and Safety Regulations, 1996 (Appendix B).

Storage

Refer to Section 5 for general biomedical waste storage requirements.

Long-term storage is not advocated and the generator should arrange for transport as soon as possible to a SERM approved disposal facility for incineration. If immediate removal is not possible, special precaution wastes may be held in storage areas that are refrigerated at 4 degrees C or lower.

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APPENDIX A
SASKATCHEWAN BIOMEDICAL WASTE WORKING COMMITTEE

Saskatchewan Health
Population Health Branch
Northern Health Services Branch

Saskatchewan Association of Health Organizations

Saskatchewan Environment and Resource Management
Environmental Protection Branch

Saskatchewan Labour
Occupational Health and Safety Division

Saskatchewan Agriculture and Food
Veterinary and Dairy Laboratory

Saskatoon Health District

Touchwood-Qu'Appelle Health District

Regina Health District

Living Sky Health District

South Country Health District

Moose Jaw/Thunder Creek Health District

Saskatchewan Practitioners Infection Control

Midwest Health District

For further information regarding the interpretation of these guidelines please contact:

Saskatchewan Environment and Resource Management - Environmental Protection Branch	(306) 787-6137
Saskatchewan Health - Population Health Branch	(306) 787-7128
Saskatchewan Agriculture and Food - Veterinary and Dairy Laboratory	(306) 787-6435
Saskatchewan Labour - Occupational Health and Safety Division	1-800-567-SAFE
Saskatchewan Highways & Transportation	(306) 787-4801
Saskatchewan Association of Health Organizations	(306) 525-2741
Saskatchewan Practitioners Infection Control	(306) 787-3193

APPENDIX B
SASKATCHEWAN LABOUR
OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS

The following sections of the Occupational Health and Safety Regulations, 1996, may pertain to biomedical wastes:

- Part XXI, Chemical and Biological Substances
- Section 85, Exposure to Infectious Materials and Organisms
- Section 471 Cytotoxic Drugs; and
- Section 472, Wastes

Following is a summary of the requirements:

Employers must determine and record the hazards associated with exposures of workers to biomedical wastes and provide this information to the workers. Employer should prepare generic material safety data sheets for the different types of hazardous biomedical wastes and make these available to workers and self-employed persons who collect, transport and dispose of hazardous biomedical wastes.

Hazardous wastes (infectious, cytotoxic, sharps contaminated with infectious or cytotoxic materials) must be segregated and contained within a secure package or container that holds the content safely. Containers must be clearly labelled. Infectious hazardous wastes should be identified by a label with the biohazard symbol.

Workers who collect, transport or dispose of hazardous wastes must be trained on proper work procedures, emergency procedures (i.e., when there is an accumulation, spill, leak or exposure) and on the use of personal protective equipment. Workers must be familiar with the labelling system being used to distinguish hazardous wastes (Appendix J - Transport Canada, Transportation of Dangerous Goods Regulations - Overview).

Where a worker has been exposed to hazardous waste to an extent that may affect their health or safety, the employer, in consultation with the committee shall investigate and report on the incident.

The above requirements apply to all hazardous biomedical wastes. There are additional requirements for cytotoxic and infectious wastes.

Cytotoxic Drugs

Where the hazardous waste contains cytotoxic drugs a written program must be prepared describing the procedures mentioned above.

The program must be developed in consultation with the Occupational Health Committee or workers where there is no committee, and provided to workers who collect, transport and dispose of cytotoxic drugs.

Infectious Material or Organisms

Infectious material or organisms are defined in the Saskatchewan Occupational Health and Safety Regulations as those that are listed in Table 14 of the regulations. Table 14 is a classification of infectious materials or organisms according to risk and is based on the Medical Research Council of Canada listing for Risk Groups 2-4.

Where workers are required to handle infectious material or organisms the employer must develop and implement a written plan.

The plan must identify disease characteristics of infectious material or organisms that may be encountered at work:

- Ways in which the infectious material or organisms can enter the body and the risks associated with that entry.

- Signs and symptoms of an infectious disease that may arise after exposure.

Workers who may be exposed to infectious material or organisms must be identified. These workers may include health care workers, janitorial, transport and final disposal workers.

The plan must describe procedures for:

- infection control;
- spills, leaks or possible exposures involving infectious material or organisms;
- disinfection or disposal of contaminated clothing or equipment;
- investigating and documenting exposure incidents or occurrences of occupationally transmitted infections;
- training workers;

The plans must be developed in consultation with the Occupational Health Committee or workers where there is no committee, and provided to workers who collect, transport and dispose of infectious waste. The plan must be reviewed every 2 years and amended where needed.

APPENDIX C
AGENTS OF ANIMAL BIOMEDICAL WASTES *

Bacteria

Bacillus anthracis
Brucella - all species
Francisella tularensis, type A and type B
Mycobacterium bovis
Mycobacterium tuberculosis
Mycoplasma agalactia (contagious agalactia)
Pseudomonas mallei, P pseudomallei
Mycoplasma mycoides (contagious bovine pleuropneumonia)
Yersinia pestis

Rickettsia

Chlamydia psittaci **
Coxiella burnetii (unless inapparent infection)
Infectious Bovine Petechial Fever (Ondiri)
Trypanosoma equiperdum (Dourine)
Rickettsia ruminatum

Viruses

African swine fever virus
African horse sickness virus
Avian influenza (fowl plague)
Borna disease virus
Bovine spongiform encephalopathy
Chikungunya virus
Chronic infectious neuropathic agents (CHINAs)
Crimean-Congo hemorrhagic fever virus
Eastern equine encephalitis virus
Ebola virus
Foot and Mouth Disease Virus
Goatpox
Hantaan, Korean hemorrhagic fever, and epidemic nephrosis viruses
Herpesvirus ateles, Herpesvirus saimiri
Hog cholera virus
Human T Cell leukemia/lymphoma virus
Human immunodeficiency viruses
Japanese encephalitis virus
Kyasanur forest virus
Lassa, Junin, and Machupo viruses
Louping ill virus (animal inoculation)
Lumpy skin disease

Lymphocytic choriomeningitis
Marburg virus
Mason-Pfizer monkey virus
Monkey B virus
Monkeypox
Murray Valley encephalitis virus
Newcastle disease virus (velogenic strains)
Omsk hemorrhagic fever virus
Oncornavirus D from primates
Peste des petits ruminants
Piry virus
Pseudorabies
Rabies street virus
Rhinderpest
Rift valley fever virus
Russian spring-summer encephalitis virus
Sheeppox
Swine vesicular disease
Teschen disease virus
Turkey rhinotracheitis
Variola
Venezuelan equine encephalitis (except Strain TC83)
Vesicular exanthema virus
Vesiculovirus genus; all isolates (except Vesicular Stomatitis (animal inoculation))
Wesselobron disease
Western equine encephalitis

Fungi

Blastomyces dermatitidis
Coccidiodes immitis
Histoplasma capsulatum
Paracoccidiodes brasiliensis

Parasites

Echinococcus (gravid segments)

* Fully controlled agents as listed in the Transportation of Dangerous Goods Regulations (TDGR) for Risk Group IV, Risk Group III (except for the six listed in section 2.3.3(4)), and the nine Risk-Group II agents in 2.3.3(3); or the agents meet the criteria in Part III of TDGR.

** Although not listed as a fully controlled agent in The Transportation of Dangerous Goods Regulation, Chlamydia psittaci is included on the Canadian Veterinary Medical Association listing for agents of Animal Biomedical Wastes.

APPENDIX D
AUTOCLAVING/ENCAPSULATION

Autoclaving

Autoclaving of sharps wastes must be performed by trained personnel using safe and effective techniques. Hospital infection control staff are generally able to provide sound advice on worker safety concerns while ensuring adequate decontamination methodologies. Careful attention must be paid to the treatment methods to ensure that the wastes are in fact "decontaminated" by the autoclave process. Records of quality assurance tests, such as steri-cheks, and biomedical waste disposal manifests, shall be retained (one year minimum retention is recommended).

Encapsulation

Encapsulation is an alternate method of preparing sharps wastes containers for disposal at a SERM approved solid waste disposal site where autoclaving and a dedicated biomedical waste area at a SERM approved solid waste disposal site is not an option. Sharps wastes that have been encapsulated can be discarded via general waste stream at the generator's facility.

Many solid waste disposal site operators use heavy equipment to compact waste material before burial. The purpose of encapsulation is to ensure that individual sharps cannot be freed through an inadvertent bursting of the sharps wastes container through such actions.

A variety of encapsulators are available, such as epoxy, grout, and concrete. However, it is imperative that the encapsulation of sharps wastes for ultimate disposal in a solid waste disposal site is consistent with the following criteria, regardless of the encapsulator that is used.

1. The encapsulating mixture must be mixed sufficiently fluid to penetrate the collected sharps to the bottom of the container.

2. The encapsulating mixture must surround ALL the collected sharps wastes.

3. The encapsulating mixture must "set" to a rigid form prior to disposal in a solid waste disposal site.

4. The encapsulator must not be of an expanding nature that will burst the sharps wastes container.

Sharps wastes that are encapsulated using these criteria do not have to be specially marked and may be handled in a general waste manner. However, it is recommended that where a dedicated site is used that this be the preferred method for such sharps wastes containers.

APPENDIX E
HEALTH OF ANIMALS ACT (CANADA) - REPORTABLE DISEASES

Item	Disease
1	anaplasmosis
2	equine infectious anemia
3	brucellosis
4	cysticercosis (bovine)
5	bovine spongiform encephalopathy
6	swine vesicular exanthema
7	bluetongue
8	foot-and-mouth disease
9	anthrax
10	sheep scab
11	mange
12	avian influenza
13	dourine (mal du coit)
14	swine vesicular disease
15	contagious equine metritis
16	glanders
17	rinderpest
18	African swine fever
19	hog cholera
20	equine piroplasmosis
21	avian pneumoencephalitis (Newcastle disease)
22	pseudorabies (Aujeszky's disease)
23	pullorum disease
24	rabies
25	vesicular stomatitis
26	scrapie
27	trichinosis
28	tuberculosis
29	fowl typhoid
30	varroasis

APPENDIX F
CONTAINER SPECIFICATIONS

Reusable Containers

Reusable waste containers must be made of rigid plastic and able to withstand exposure to the common cleaning agents. They should be colour-coded according to the class of waste for which they are intended and labelled with the biohazard symbol.

Reusable waste containers should be inspected for holes or leaks each time they are emptied and their colour-coding and labelling renewed if necessary. Holes or leaks must be repaired or the waste container replaced.

Reusable waste containers must be disinfected regularly to prevent odours as soon as possible if waste materials leak or spill within the containers.

Sharps Containers

The critical characteristic of any sharps container is that it be sturdy enough to resist puncture under the conditions of use and to the point of disposal. Until an engineering method is developed to determine this objectively, sharps containers should be tested and evaluated under actual conditions of use.

Sharps containers should be colour-coded yellow but must be labelled with the biohazard symbol and have lids that can be tightly secured. Sharps containers used for cytotoxic waste must also be properly labelled and identified. If sharps containers are to be autoclaved, they must remain functionally intact at high autoclaving temperatures.

Other useful features include:

- a fill line and must be sturdy enough to resist puncture under normal conditions of use and handling until the containers are disposed of;
- features permitting simplified handling and movement of filled containers before disposal;
- a means by which unauthorized individuals are prevented from removing items from the container or from removing the container itself;
- a design that allows stacking;
- a means that allows the container to be attached to medication carts, treatment carts or in ambulance or other mobile applications.

Sharps containers should be conveniently located close to the point of use to reduce the likelihood of injury. They should not be filled to more than three-quarters of their useable volume in order to prevent injuries due to overfilling. Sharps should never be forcibly pushed into the container. Sharps containers should not be filled or partially filled with a liquid disinfectant solution.

Plastic Waste - Holding Bags

The plastic waste-holding bag shall be sturdy enough to resist puncture under conditions of use and to the point of disposal. Each facility should fully test and evaluate the bags under actual conditions used.

Plastic waste - holding bags must also be colour-coded and comply with any other regulatory performance standards.

Note: For the purposes of in-house collection and movement of waste, it is inappropriate to specify a minimum thickness of plastic bags or plastic sharps wastes containers as plastic materials vary extensively in their physical and mechanical properties. A 25.4 micrometer thick film of one plastic material may be more resistant to puncture, impact, and abrasion than a 50.8 micrometer thick film of a different plastic material. The properties can be further affected by the manufacturing process (i.e., extrusion versus injection moulding).

Cardboard Containers

Cardboard containers should be colour-coded and must be labelled with the biohazard symbol; rigid; closeable; leak-resistant; capable of being sealed.

Note: If cardboard containers are to be shipped off-site and are not to be supplemented with an additional outer packaging meeting the requirements of Transportation of Dangerous Goods Regulations, then the cardboard container itself must meet the requirements of the regulations.

PACKAGING OF BIOMEDICAL WASTES

Waste Class	Colour-Coding	Labelling
Animal Biomedical Wastes	Orange	Biohazard Symbol
Cytotoxic Chemical Waste	Yellow	Biohazard and Cytotoxic Symbols
Human Anatomical Wastes	Red	Biohazard Symbol
Human Blood and Body Fluids Wastes	Yellow	Biohazard Symbol
Microbiology Laboratory Wastes	Yellow	Biohazard Symbol
Sharps Wastes	Yellow	Biohazard symbol & cytotoxic (when necessary)
Special Precaution Wastes	Orange	Biohazard Symbol

Labelling Symbols

Biohazard Symbol

Cytotoxic Symbol

APPENDIX G
GENERAL GUIDELINES FOR DISPOSAL OF SHARPS WASTES

Objective

The objective of this guideline is to provide an approach to the management of sharps wastes generated at small institutional type facilities (e.g., personal care homes), agricultural livestock operations and the general public (e.g., diabetics) that will protect waste handlers and the public from exposure to infectious waste or injury caused by sharps wastes.

Handling, Packaging and Disposal Details

Sharps wastes should be properly contained in a puncture resistant container that is colour-coded yellow, and is labelled with a biohazard symbol and secured with a tightly fitted lid (Appendix F). Approved containers can be purchased through those health districts that provide a sharps wastes handling and disposal program and some local pharmacies.

Generators of sharps wastes, including small institutional facilities, agricultural livestock operations and the general public, should dispose of sharps wastes at an approved collection facility such as:

- a health facility that accepts sharps wastes from external sources (contact your local health district for information on participating facilities);

- a sharps wastes recovery program drop-off site. (Many pharmacies participate in this program. Contact the Saskatchewan Pharmaceutical Association for information on participating pharmacies). **Note:** Livestock operators are encouraged to collaborate with participating pharmacies to ensure proper disposal of sharps wastes;

OR

- Where neither option is available, at a SERM approved solid waste disposal site which has a portion of the site dedicated for the disposal of biomedical waste and where **immediate** internment of the sharps wastes shall take place. If immediate internment does not take place, the sharps wastes must be encapsulated (Appendix D) prior to disposal at a solid waste disposal site. **In both cases** care must be taken to ensure that the sharps wastes containers are not subject to direct compacting by heavy equipment.

APPENDIX H
HOSPITAL INCINERATORS

For further information, please contact your local Saskatchewan Environment and Resource Management, Environmental Protection Office.

Grassland EcoRegion

Environmental Protection Manager
Saskatchewan Environment & Resource Management
3211 Albert Street
Regina, Saskatchewan S4S 5W6

787-6205
787-0197 (FAX)

Parkland EcoRegion

Environmental Protection Manager
Saskatchewan Environment & Resource Management
102 - 112 Research Drive
Saskatoon, Saskatchewan S7K 2H6

933-6546
933-8442 (FAX)

East Boreal EcoRegion

Environmental Protection Manager
Saskatchewan enviornment & Resource Management
6th Floor - P.O. Box 3003
Prince Albert, Saskatchewan S6V 6G1

953-2662
953-2502 (FAX)

West Boreal EcoRegion

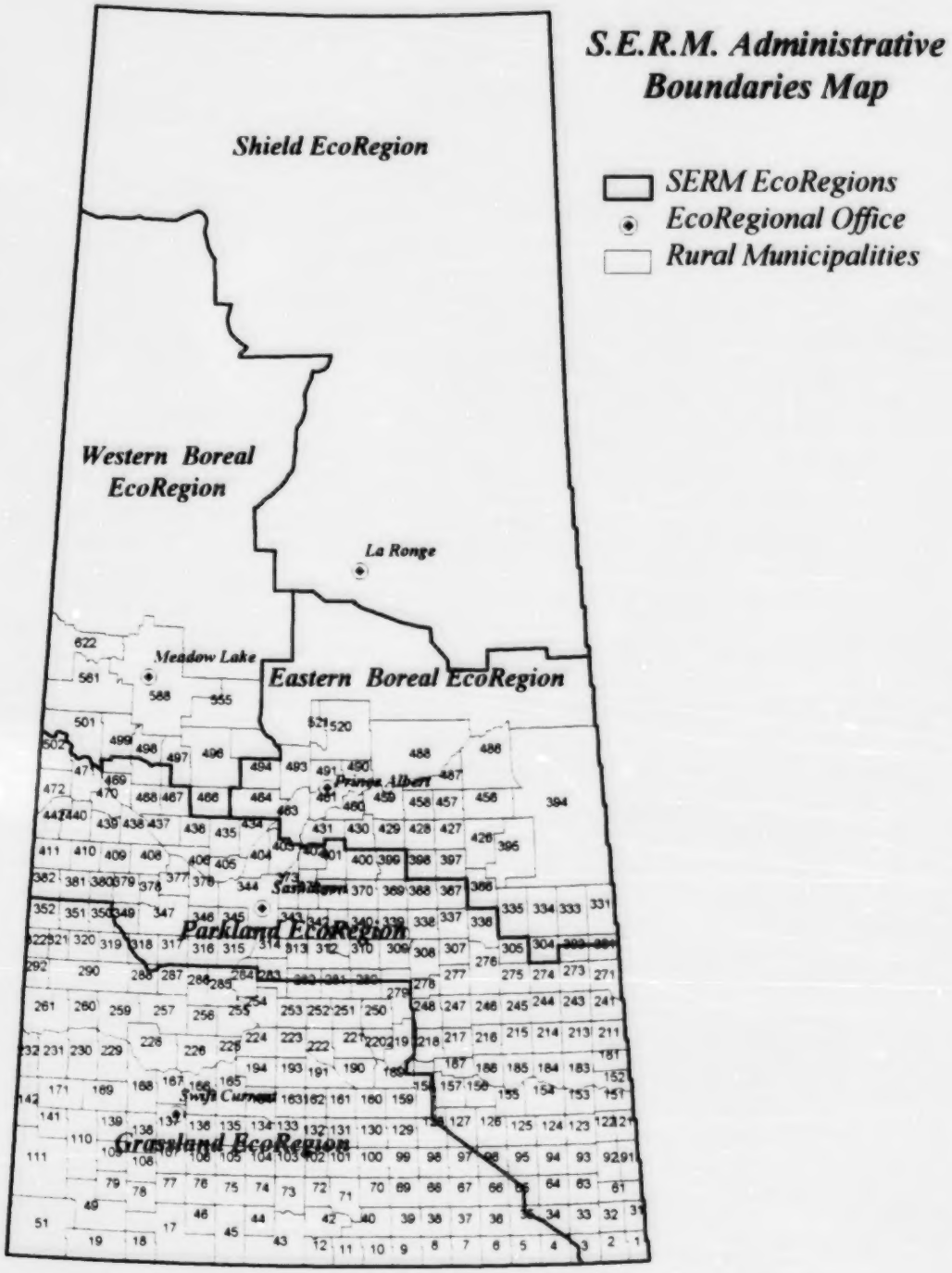
Environmental Protection Manager
Saskatchewan Environment & Resource Management
Unit 1 - 201 2nd Street West
Meadow Lake, Saskatchewan S9X 1C7

236-7540
236-7677 (FAX)

Shield Eco-Region

Environmental Protection Manager
Saskatchewan Enviornment & Resource Management
P.O.Box 5000
La Ronge, Saskatchewan S0J 1L0

425-4310
425-2580 (FAX)


S.E.R.M. Administrative Boundaries Map
SERM EcoRegions
EcoRegional Office
Rural Municipalities
Shield EcoRegion
Western Boreal EcoRegion
La Ronge
Meadow Lake
Eastern Boreal EcoRegion
Prince Albert
Saskatoon
Parkland EcoRegion
Swift Current
Grassland EcoRegion

APPENDIX I
ANIMAL NON-BIOMEDICAL WASTES
WASTE MANAGEMENT PROCEDURES

Strategy

Note: For proper waste management procedures for animal wastes classified as biomedical waste, see Section 6 - Animal Biomedical Wastes.

Animal Non-Biomedical Wastes may be incinerated at a facility approved by SERM, buried at a solid waste disposal site, buried on the owners property*, or consigned to a rendering plant where appropriate. Where animal non-biomedical wastes are to be disposed at a solid waste disposal site, the wastes shall be covered as soon as practical. Prior to transporting the waste, the generator should contact the municipality operating the solid waste disposal site for approval and making appropriate arrangements. Animal non-biomedical liquid wastes can be disposed of by pouring into the sewer, provided the local municipality approves. Bedding wastes may be disposed via the solid waste disposal site or other traditional methods for animal husbandry wastes.

In cases where animal non-biomedical wastes are also governed under the Health of Animals Act (Canada), the inspector identified within the Act has the authority to require disposal by means other than outlined in these guidelines.

Handling, Packaging and Transportation Details

- No other types of wastes should be mixed or included with animal non-biomedical wastes other than the associated disposable items which are saturated or dripping with blood or body fluids; and

- Where disposal of small animals or small portions of animal non-biomedical waste by burial at a solid waste disposal site is selected, the containers used should be able to withstand transport to the site intact. The containers may include plastic bags or plastic bags within cardboard containers, if the integrity of the bags during the transportation process is at all suspect. All containers of waste must bear a "NON-HAZARDOUS" label. These wastes should be transported apart from general wastes but may be transported along with other types of biomedical waste. Containers for animal non-biomedical waste may be colour coded blue or green but must not be coloured orange; or

- Where disposal of large animal carcasses at a solid waste disposal site is selected, the carcass should be placed within a transport vehicle, the floor of which is lined with an absorbent material. Body fluids should be contained as well as possible. The load should be covered immediately following loading and at all times during transport. All loads should be transported as soon as possible and the vehicle should be decontaminated following the removal of the waste. Waste should be transported directly to the solid waste disposal site selected using the most direct route. The person in charge of the load should be in attendance at all times. Wastes should be covered immediately; or

- Where disposal of animal non-biomedical wastes of this subclass by means of off-site incineration is selected, the wastes should be packed and transported in a manner as was noted under Section 6 - Animal Biomedical Wastes except containers should not be colour coded orange; or

- Where disposal by means of a rendering plant is selected, the waste should be packaged within 45 gallon barrels or a dedicated enclosed transport vehicle. The barrels should be sealed or the load should be covered during transport. All loads should be transported as soon as possible and the vehicle should be decontaminated following the removal of the waste. Waste should be transported directly to the rendering plant using a planned direct route. The person in charge of the load should be in attendance at all times.

Storage

After animal non-biomedical waste has been collected and moved from its point of generation, it may be held in storage areas to wait disposal. The storage areas should be totally enclosed, separate from supply rooms and food preparation areas, and contain no other materials except for other wastes. Where practical and appropriate, storage of animal anatomical wastes should be at temperatures of 4°C or lower if stored for more than four days. Anatomical waste preserved with formalin or equivalent does not require refrigerated storage.

Facilities refrigerating or freezing stored animal waste should use a lockable, closed, cold storage facility or a lockable, domestic-type freezer unit. **"WARNING: Units After Being Used for Storage of Animal Waste Should Be Permanently Marked to Prevent Recycling as a Food Storage Appliance"**. Either type must be used only for storing waste.

Floors, walls and ceilings of storage areas must be thoroughly cleaned in accordance with the facility's established procedures. These procedures should be prepared in consultation with the Facilities Infection Control Committee, Biosafety Officer, or other appointed person(s).

There should be a contingency plan in the event of refrigerator or freezer breakdown, disposal becoming unavailable, or excessive amounts of waste being produced.

* For information on proper burial of animal carcasses, contact your local Saskatchewan Agriculture and Food office.

APPENDIX J
TRANSPORT CANADA -TRANSPORTATION OF DANGEROUS GOODS REGULATIONS OVERVIEW

Infectious substances are now defined as "substances containing viable microorganisms, ... that are known or reasonably believed to cause disease in humans or animals, and that are included in risk group II, III or IV...". For example, infectious substances can be cultures, isolates, diagnostic specimens (large or small), or biological products (e.g., blood products for research or live or attenuated vaccines).

Infectious substances are divided into four risk groups. These risk groups represent the level of risk of disease based on the ability of the infectious substance to cause and spread disease and the severity of that disease. Microorganisms are classified into these four risk groups depending on virulence, transmissibility, pathogenicity and availability of treatment. Risk group IV is the most hazardous, risk group III is moderately hazardous and risk group II is mildly hazardous. Risk group I substances are not hazardous to humans or animals and are not regulated.

The risk group classification criteria were first introduced by the World Health Organization and adopted by Health Canada and the Medical Research Council of Canada in their 1990 publication *Laboratory Biosafety Guidelines*. From these Guidelines, Transport Canada took the risk group classification criteria which you will find in Part III of the TDGR and which describe each risk group in detail. Transport Canada also took from the Guidelines the lists of organisms together with their assigned risk groups. These lists are found in Schedule VII of the TDGR and have been expanded to give more examples of organisms in each risk group.

Transport Canada, with input from the medical community, evaluated the risk groups and the hazards involved in transporting infectious substances and developed two categories: the fully controlled infectious substances and the partially controlled infectious substances. The fully controlled infectious substances include the risk group IV organisms, all but six of the risk group III organisms and nine organisms in risk group II. The fully controlled infectious substances are subject to all of the safety requirements in the TDGR. The partially controlled infectious substances are subject to a packaging requirement.

According to the TDGR, the consignor decides if a substance is infectious. The new definition of consignor limits the "consignor" to a medical doctor, scientist, veterinarian, epidemiologist, genetic engineer, microbiologist, pathologist, nurse, coroner or laboratory technologist. In other words, a person who has access to the required information and the knowledge to evaluate it.

The consignor must classify the microorganism into a risk group in one of three ways: by using the classification criteria in Part III, by finding the name of the microorganism in Schedule VII or by determining that the microorganism has similarities to one listed in Schedule VII. The consignor should use a degree of judgement when classifying these dangerous goods. Several factors can influence a consignor's decision. For example:

- Work that involves mutation or frequent subculturing of a microorganism may affect a microorganism's virulence, transmissibility or pathogenicity and the consignor may find it preferable to determine the most reasonable classification by applying the classification criteria or by evaluating the similarities/differences to the original microorganism named in Schedule VII.

- If a strain of bacteria becomes resistant to a wide range of antibiotics and the disease it causes is difficult to treat, a consignor may think it best to classify it in a higher risk group, for example, from a risk group II to risk group III even if it is listed as a risk group II in Schedule VII.

- Treating microorganisms using freeze drying, chemical preservation or heat can also affect its original risk group assignment and the consignor may choose to re-evaluate its classification.

Any risk group assignment is not absolute and there is room for addressing variances. The following is a description of Risk Group Class 6.

Microorganism, and recombinants, hybrids or mutants thereof, that affect humans or animals and that are included in Division 2 of Class 6 of the Transportation of Dangerous Goods shall be included in:

1. Risk group IV if they are known to present a similar level of risk of disease as that of the infectious substances the type that include:

    - bacteria, mycoplasma and rickettsia
    - parasites
    - viruses

    or they exhibit similar characteristics including the following:

    - the disease they cause has serious affects that may be irreversible or lethal in humans or animals that have contracted the disease;
    - they are readily transmitted from an infected human or animal to an uninfected human or animal, directly or indirectly or by casual contact, thereby representing a high individual risk and high community risk; and
    - one of the following cases applies:

        (i) the disease they cause is difficult to treat and often untreatable, or
        (ii) exposure to them leads to the disease they cause.

Risk Group IV - Infectious Substance Listings Found in Schedule VII of the Transportation of Dangerous Goods Regulations

Bacteria, Mycoplasma and Rickettsia

Mycoplasma mycoides*

Parasites

Infectious Bovine Petecchial Fever (Ondiri)*
Trypanosoma equiperdum (Dourine)*

Viruses

Arenaviridae
- Lassa virus
- Junin virus
- Machupo virus

Bornaviridae
- Borna disease virus*

Bunyaviridae
- Genus Nairovirus: Crimean-Congo hemorrhagic fever

Caliciviridae
- Swine vesicular disease*
- Vesicular exanthema virus*

Filoviridae
- Marburg virus
- Ebola virus

Flaviviridae
- Tick-borne encephalitis complex, including:
- Kyasanur forest virus
- Omsk hemorrhagic fever
- Russian spring-summer encephalitis

Herpesviridae
- Alphaherpesvirinae
- Genus Simplexvirus: Herpes B virus (Monkey B virus)
- Pseudorabies*
- Turkey rhinotracheitis*

Iridoviridae
- African swine fever virus*

Orthomyxoviridae
- Avian Influenza (Fowl plague)*

Paramyxoviridae
- Genus Morbillivirus: Rinderpest*
- Newcastle disease virus (velogenic strains)*
- Peste des petits ruminants*

Picornaviridae
- Genus Aphthovirus: Foot-and-mouth disease*
- Genus Enterovirus: Teschen disease virus*

Poxviridae
- Chordopoxvirinae (poxviruses of vertebrates)*
- Small pox (Alastrim)*
- Genus Capripoxvirus:
  - Sheeppox*
  - Goatpox*
  - Lumpy skin disease*
- Genus Orthopoxvirinae:
  - Monkey pox
  - Variola

Reoviridae
- African horse sickness virus*

Togaviridae
- Hog cholera virus*

2. Risk group III if they are known to present the same level of risk of disease as that of the infectious substances as follows:

   • bacteria, mycoplasma and rickettsia
   • fungi
   • viruses

or they exhibit similar characteristics including the following:

- the disease they cause seriously affects the health of humans or animals that have contracted the disease;
- they are not readily transmitted from an infected human or animal to an uninfected human or animal by casual contact, thereby representing a high individual risk and low community risk; and
- one of the following cases applies:

  (i) the disease they cause can be treated by antimicrobial or antiparasitic agents, or
  (ii) exposure to them is likely to lead to the disease they cause.

Risk Group III - Infectious Substance Listings Found in Schedule VII of the Transportation of Dangerous Goods Regulations

Bacteria, Mycoplasma and Rickettsia

Bacillus anthracis
Brucella-all species
Chlamydia psittaci-avian strains only
Coxiella burnetii
Francisella tularensis, Type A (biovar tularensis)
Mycobacterium avium
Mycobacterium bovis (non-BCG strains)
Mycobacterium tuberculosis
Mycoplasma agalactiae*
Pasteurella multocida, Type B
Pseudomonas mallei
Pseudomonas pseudomallei
Rickettsia-all species (except R. ruminantum)
Yersinia pestis

Fungi

Moniliaceae
Blastomyces dermatitidis
Coccidioides immitis
Histoplasma capsulatum, including variety duboisii
Paracoccidioides brasiliensis

Viruses

Viruses are grouped within Family and/or Genus.

Arenaviridae
- Lymphocytic choriomeningitis virus, neurotropic strains

Bunyaviridae
- Genus Phlebovirus: Rift Valley fever virus*
- Unclassified Bunyaviruses:
  - Epidemic nephrosis viruses
  - Hantaan
  - Korean hemorrhagic fever

Flaviviridae
- Japanese encephalitis virus
- Murray Valley encephalitis virus
- Powassan
- St. Louis encephalitis virus
- Yellow fever virus (wild type)

Herpesviridae
- Gammaherpesvirinae
- Genus Rhadinovirus:
  - Herpesvirus ateles
  - Herpesvirus saimiri

Retroviridae
- Oncovirinae
- Genus Oncovirus C:
  - Human T-cell leukemia/lymphoma virus (HTLV-I and HTLV-II if cultured)
- Genus Oncornavirus D:
  - Mason-Pfizer monkey virus
  - Viruses from primates
- Lentivirinae
  - Human immunodeficiency viruses (HIV-all isolates if cultured)

Rhabdoviridae
- Genus Lyssavirus: Rabies virus (Street virus)
- Genus Vesiculovirus: Piry

Togaviridae

Genus Alphavirus:

Chikungunya - (recent isolates)
Eastern equine encephalitis virus
Venezuelan equine encephalitis (except Strain TC-83)
Western equine encephalitis
Louping ill virus (Animal inoculation)*
Wesselsbron disease virus*

Unclassified Viruses

Chronic infectious neuropathic agents:
Creutzfeld-Jakob agent, Kuru agent (higher amounts of agent) [**Note:** Special handling and disposal procedures for Creutzfeld-Jakob agent may apply. For further guidance, contact Saskatchewan Health - Population Health Branch - Appendix A]

Bovine Spongiform Encephalopathy*

3. Risk group II if they are known to present a similar level of risk of disease as that of the infectious substances of the type that include:

- bacteria, rickettsia, chlamydia and mycoplasma
- fungi
- parasites
- viruses

or they exhibit similar characteristics including the following:

- the disease they cause does not seriously affect the health of humans or animals that have contracted the disease;
- they are rarely transmitted from an infected human or animal to an uninfected human or animal by direct contact, thereby representing a moderate individual risk and a limited community risk; and
- one of the following cases applies:

  (i) there exists readily available treatment for humans and animals who have contracted the disease they cause, or
  (ii) exposure to them rarely leads to the disease they cause.

RISK GROUP II - Infectious Substance Listings Found in Schedule VII of the Transportation of Dangerous Goods Regulations

Bacteria, Rickettsia, Chlamydia and Mycoplasma

Actinobacillus-all species
Anaplasmosis (A. marginale)

Bacillus cereus
Bartonella bacilliformis
Bordetella bronchiseptica
Bordetella parapertussis
Bordetella pertussis
Borrelia burgdorferi
Borrelia recurrentis
Borrelia vincentii
Campylobacter subspecies or Campylobacter fetus or Campylobacter jejuni
Chlamydia psittaci
Chlamydia trachomatis
Clostridium botulinum
Clostridium chauvoei
Clostridium difficile
Clostridium haemolyticum
Clostridium histolyticum
Clostridium novyi
Clostridium septicum
Clostridium sordellii
Clostridium tetani
Corynebacterium diphtheriae
Corynebacterium haemolyticum
Corynebacterium pseudotuberculosis
Corynebacterium pyogenes
Edwardsiella tarda
Erysipelothrix insidiosa
Escherichia coli-all enterotoxigenic, invasive and hemorrhagic strains
Francisella tularensis, Type B (biovar palaearctica)
Francisella novocida
Fusobacterium necrophorum
Haemophilus ducreyi
Haemophilus influenzae
Legionella subspecies
Leptospira interrogans-all serovars
Listeria monocytogenes
Mycobacteria-all species (except M. avium, M. bovis (non-BCG strains) and M. tuberculosis)
Mycoplasma hominis
Mycoplasma pneumoniae
Neisseria gonorrhoeae
Neisseria meningitidis
Nocardia asteroides
Nocardia brasiliensis
Pasteurella - all species (except Pasteurella multocida Type B)

Rickettsia ruminantum*
Salmonella enterica or Salmonella choleraesuis
Salmonella enterica, serovar Arizonae or Arizona hinshawii
Salmonella enterica, serovar gallinarum-pullorum or Salmonella gallinarum-pullorum
Salmonella enterica, serovar meleagridis or Salmonella meleagridis
Salmonella enterica, serovar paratyphi B or Salmonella paratyphi B or Schottmulleri
Salmonella enterica, serovar typhi or Salmonella typhi
Salmonella enterica, serovar typhimurium or Salmonella typhimurium
Shigella boydii
Shigella dysenteriae
Shigella flexneri
Shigella sonnei
Staphylococcus aureus
Streptobacillus moniliformis
Streptococcus subspecies (Lancefield Groups A, B, C, D and G)
Taylorella equigenitalis (contagious equine metritis)*
Treponema carateum
Treponema pallidum
Treponema pertenue
Ureaplasma urealyticum
Vibrio cholerae (including El Tor)
Vibrio parahaemolyticus
Yersinia enterocolitica
Yersinia pseudotuberculosis

Fungi

Cryptococcaceae
- Candida albicans
- Cryptococcus neoformans

Moniliaceae
- Aspergillus flavus
- Aspergillus fumigatus
- Epidermophyton floccosum
- Microsporum subspecies
- Sporothrix schenckii
- Trichophyton subspecies

Parasites

Arthropoda
- Sarcoptes
- Chorioptes
- Psoroptes

Cestodes
- Echinococcus (gravid segments)
- Hymenolepsis diminuta
- Hymenolepsis nana (human origin)
- Taenia saginata
- Taenia solium

Helminths-Nematodes
- Ancylostoma duodenale
- Angiostrongylus subspecies
- Ascaris subspecies
- Brugia subspecies
- Loa loa
- Necator americanus
- Onchocerca volvulus
- Strongyloides subspecies
- Toxocara canis
- Trichinella subspecies
- Trichuris trichiura
- Wuchereria bancrofti

Trematodes
- Clonorchis sinensis
- Fasciola hepatica
- Opisthorchis subspecies
- Paragonimus westermani
- Schistosoma haematobium
- Schistosoma japonicum
- Schistosoma mansoni
- Besnoitia besnoiti*
- Theileria annulata*
- Theileria bovis*
- Theileria hirci*
- Theileria lawrencei*
- Theileria parva*
- Trypanosoma evansi*
- Trypanosoma vivax*
- Varroa jacobsoni*

Protozoa
- Babesia microti
- Babesia divergens
- Balantidium coli
- Cryptosporidium subspecies
- Entamoeba histolytica
- Giardia subspecies (mammalian)
- Leishmania subspecies (mammalian)
- Naegleria fowleri
- Plasmodium subspecies (human or simian)
- Pneumocystis carinii
- Toxoplasma gondii
- Trypanosoma brucei
- Trypanosoma cruzi

Viruses

Adenoviridae
- Adenoviruses, all serotypes

Arenaviridae
- Lymphocytic choriomeningitis virus, (laboratory adapted strains)
- Tacaribe virus complex: Tamiami, Tacaribe, Pichinde

Bunyaviridae
- Genus Bunyavirus:
  - Bunyamwera and related viruses
  - California encephalitis group, including La Crosse, Lumbo and snowshoe hare
- Genus Phlebovirus: all species (except Rift Valley fever virus*)
- Nairobi sheep disease*

Caliciviridae
- All isolates

Coronaviridae
- Human coronavirus, all strains
- Transmissible gastroenteritis virus of swine
- Hemagglutinating encephalomyelitis virus of swine
- Mouse hepatitis virus
- Bovine coronavirus*
- Feline infectious peritonitis virus
- Avian infectious bronchitis virus
- Canine, rat and rabbit coronaviruses

Flaviviridae
- Yellow fever virus (17D vaccine strain)
- Dengue virus (serotypes 1,2,3 and 4)
- Kunjin virus

Hepadnaviridae
- Hepatitis B virus

Herpesviridae
- Alphaherpesvirinae: all isolates (except pseudorabies virus and herpes B virus)
- Genus Poikilovirus: all isolates
- Genus Varicellavirus: all isolates
- Other herpesviruses unclassified as yet, including:
  - Infectious bovine rhinotracheitis
  - Equine coital exanthema virus
  - Feline infectious rhinotracheitis
  - Chicken infectious Laryngotracheitis virus
  - Channel catfish virus
- Betaherpesvirinae
  - Genus Cytomegalovirus: all isolates
- Genus Muromegalovirus: all isolates
- Gammaherpesvirinae
  - Genus Lymphocryptovirus: all isolates (except Herpesvirus ateles and Herpesvirus samiri)
  - Genus Thetalymphocryptovirus: all isolates

Orthomyxoviridae
- Genus Influenzavirus:
  - Influenza virus Type A: all isolates
  - Influenza virus Type B: all isolates
  - Influenza virus Type C: all isolates

Papovaviridae
- Genus Papillomavirus: all isolates
- Genus Polyomavirus: all isolates

Paramyxoviridae
- Genus Morbillivirus: all isolates (except Rinderpest*)
- Genus Paramyxovirus: all isolates
- Genus Pneumovirus: all isolates
- Newcastle disease (mesogenic strains)*

Parvoviridae
- Genus Parvovirus: all isolates

Picornaviridae
- Genus Aphthovirus (except foot-and-mouth disease virus*)
- Genus Cardiovirus: all isolates
- Genus Enterovirus: all isolates (except Teschen disease virus)
- Genus Rhinovirus: all isolates

Poxviridae
- Chordopoxvirinae (poxviruses of vertebrates)
- Genus Avipoxvirus: all isolates
- Genus Leporipoxvirus: all isolates
- Genus Orthopoxvirinae: all isolates
- (except Monkeypox and Variola)
- Genus Parapoxvirus: all isolates
- Genus Suipoxvirus:
  - Camelpox*
  - Swinepox*
- All other unclassified poxviruses of vertebrates

Reoviridae
- Genus Orbivirus: all isolates (except African horse sickness virus)
- Genus Rotavirus: all isolates

Retroviridae
- Oncovirinae
- Genus Oncovirus B: all isolates
- Genus Oncovirus C:
  - Subgenus Oncovirus C avian: all isolates
- Subgenus Oncovirus C mammalian: all isolates, including
- HTLV-I and HTLV-II, only as non-cultured specimens
- Lentivirinae: all isolates, including: HIV-I and HIV-II only as non-cultured specimens
- Caprine arthritis encephalitis*
- Equine infectious anemia*
- Maedi-Visna*
- Spumavirinae: all isolates

Rhabdoviridae
- Genus Lyssavirus: Rabies virus (fixed virus)
- Genus Vesiculovirus: all isolates (except Vesicular stomatitis virus (Animal inoculation)*)

Togaviridae
- Genus Alphavirus:
  - Semliki forest virus
  - Sindbis
  - Chikungunya (high passage strain)
  - O'Nyong-Nyong
  - Ross river virus
  - Venezuelan equine encephalitis (strain TC-83 only)
- Genus Arterivirus: Equine arteritis virus
- Genus Pestivirus:
  - Bovine virus diarrhoea
  - Border disease virus
- Genus Rubivirus: Rubella virus

Unclassified viruses
- Chronic infectious neuropathic agents:
  - Creutzfeld-Jakob agent [**Note:** Special handling and disposal procedures for Creutzfeld-Jakob agent may apply. For further guidance, contact Saskatchewan Health - Population Health Branch - Appendix A],
  - Kuru agent,
  - Scrapie*
  - Delta Hepatitis Virus
  - Non-A, non-B Hepatitis viruses
  - Norwalk viruses

4. Risk group I microorganisms do not cause disease in humans or animals by definition and are not considered infectious substances.

* Infectious Substance Affects Animals Only